

Amendment and Response

Applicant: Jon Ocel et al.

Serial No.: 10/056,807

Filed: January 25, 2002

Docket No.: M190.134.101

Title: FLUID-ASSISTED ELECTROSURGICAL INSTRUMENT WITH SHAPEABLE ELECTRODE

IN THE CLAIMS

Please add claim 53.

- 1.(Previously Presented) An electrosurgical instrument comprising:
an elongated shaft defining a proximal section, a distal section, and an internal lumen extending from the proximal section, wherein the distal section forms an electrically conductive rounded tip and defines at least one passage fluidly connected to the lumen for distributing fluid from the lumen outwardly from the shaft, and further wherein the shaft is adapted to be transitionable from a straight state to a first bent state, the shaft independently maintaining distinct shapes in the straight state and the first bent state; and
a non-conductive handle rigidly coupled to the proximal section of the shaft;
wherein an exterior of the shaft distal the handle and proximal the distal section is electrically non-conductive.
- 2.(Original) The electrosurgical instrument of claim 1, wherein the distal section forms a plurality of radially extending passages proximal the tip.
- 3.(Original) The electrosurgical instrument of claim 2, wherein at least two of the plurality of radially extending passages are equidistally spaced along a circumference of the distal section.
- 4.(Original) The electrosurgical instrument of claim 2, wherein the distal section forms two sets of circumferentially aligned passages.
- 5.(Original) The electrosurgical instrument of claim 1, wherein the tip defines a uniform radius of curvature.

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6.(Original) The electrosurgical instrument of claim 1, wherein the tip is adapted to be dragged across tissue during an electrosurgical procedure, and further wherein in the first bent state, the shaft orients the tip so as to define a discernable drag direction, and in the straight state, the shaft is characterized by an absence of a discernable drag direction.

7.(Original) The electrosurgical instrument of claim 1, wherein in the straight state, the shaft defines a linear axis, and further wherein in the first bent state, a portion of the shaft is deflected relative to the linear axis.

8.(Original) The electrosurgical instrument of claim 7, wherein the shaft is adapted to be transitionable to, and independently maintain a shape in, any direction relative to the linear axis.

9.(Original) The electrosurgical instrument of claim 1, wherein the shaft is capable of being bent at a multiplicity of points along a length thereof.

10.(Original) The electrosurgical instrument of claim 1, wherein the shaft is adapted to be transitionable to, and independently maintain a shape of, a second bent state different from the first bent state.

11.(Original) The electrosurgical instrument of claim 1, wherein the electrosurgical instrument is adapted for ablating heart tissue through a chest of a patient.

12.(Original) The electrosurgical instrument of claim 1, wherein the rigid coupling of the shaft and the handle is adapted such that the tip is readily manipulated in a sliding fashion via movement of the handle.

13.(Original) The electrosurgical instrument of claim 1, wherein the shaft includes:

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an elongated electrode body forming the proximal section and the distal section, the electrode body being directly coupled to the handle; and
an electrical insulator surrounding a portion of the electrode body.

14.(Original) The electrosurgical instrument of claim 13, wherein the electrode body is a tube formed of an electrically conductive, malleable material.

15.(Original) The electrosurgical instrument of claim 14, wherein the electrical insulator is configured to conform to the electrode body in the straight state and the first bent state.

16.(Original) The electrosurgical instrument of claim 1, wherein the shaft includes an elongated tube forming the proximal section and being coupled to the tip.

17.(Original) The electrosurgical instrument of claim 16, wherein the elongated tube is electrically conductive.

18.(Original) The electrosurgical instrument of claim 16, wherein the elongated tube is electrically non-conductive.

19.(Original) The electrosurgical instrument of claim 16, wherein the elongated tube is connected to the tip by a connector selected from the group consisting of weld, glue or solder.

20.(Original) The electrosurgical instrument of claim 16, wherein the tip is coupled to the elongated tube by a joint adapted to permit the tip to move relative to the elongated tube.

21.(Original) The electrosurgical instrument of claim 20, wherein the joint is a ball bearing joint adapted to allow the tip to rotate relative to the elongated tube.

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22.(Original) The electrosurgical instrument of claim 20, wherein the joint includes a pin such that the joint allows the tip to swivel relative to the elongated tube.

23.(Original) The electrosurgical instrument of claim 20, further comprising a remote actuator configured to selectively control the joint.

24.(Original) An electrosurgical system comprising:

an electrosurgical instrument including:

an elongated shaft defining a proximal section, a distal section, and an internal lumen extending from the proximal section, wherein the distal section forms an electrically conductive rounded tip and defines at least one passage fluidly connected to the lumen for distributing fluid from the lumen outwardly from the shaft, and further wherein the shaft is adapted to be transitionable from, and independently maintain a shape in, a straight state and a first bent state,

a non-conductive handle rigidly coupled to the proximal section of the shaft, wherein an exterior surface of the shaft distal the handle and proximal the distal section is electrically non-conductive,

a source of conductive fluid fluidly connected to the internal lumen; and

an energy source electrically connected to the tip.

25.(Original) The electrosurgical system of claim 24, wherein the distal section forms two sets of circumferentially aligned passages.

26.(Original) The electrosurgical system of claim 24, wherein the tip is adapted to be dragged across tissue during an electrosurgical procedure, and further wherein in the first bent state, the shaft orients the tip so as to define a discernable drag direction, and in the straight state, the shaft is characterized by an absence of a discernable drag direction.

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27.(Original) The electrosurgical system of 24, wherein in the straight state, the shaft defines a linear axis, and further wherein in the first bent state, a portion of the shaft is deflected relative to the linear axis.

28.(Original) The electrosurgical system of claim 27, wherein the shaft is adapted to be transitionable to, and independently maintain a shape in, any direction relative to the linear axis.

29.(Original) The electrosurgical system of claim 24, wherein the shaft is adapted to be transitionable to, and independently maintain a shape of, a second bent state different from the first bent state.

30. (Original) The electrosurgical system of claim 24, wherein the electrosurgical instrument is adapted for ablating heart tissue through a chest of a patient.

31.(Original) The electrosurgical system of claim 24, wherein the shaft includes:
an elongated electrode body forming the proximal section and the distal section, the
electrode body being directly coupled to the handle; and
an electrical insulator surrounding a portion of the electrode body.

32.(Original) The electrosurgical system of claim 31, wherein the electrode body is a tube formed of an electrically conductive, malleable material.

33.(Original) The electrosurgical system of claim 24, further comprising a switch coupled to the source of conductive fluid, the switch configured to control delivery of fluid from the source of conductive fluid to the internal lumen of the electrosurgical instrument.

Amendment and Response

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34.(Original) The electrosurgical system of claim 24, further comprising a switch coupled to the energy source, the switch configured to control delivery of energy from the energy source to the tip of the electrosurgical instrument.

35.(Original) The electrosurgical system of claim 34, wherein the switch is a hand switch.

36.(Original) The electrosurgical system of claim 34, wherein the switch is a foot switch.

37.(Original) The electrosurgical system of claim 24, further comprising a sensor located at the distal section of the electrosurgical instrument.

38.(Original) The electrosurgical system of claim 24, further comprising an indicator light located on the electrosurgical instrument and electrically connected to the energy source.

39.(Original) A method of performing an electrosurgical procedure, the method comprising:
providing an electrosurgical instrument including an elongated shaft and a handle, the shaft defining a proximal section rigidly coupled to the handle, a distal section forming an electrically conductive rounded tip, and an internal lumen extending from the proximal section and in fluid communication with at least one passage formed in the distal section, wherein an exterior of the shaft distal the handle and proximal the distal section is electrically non-conductive, and further wherein the shaft is provided in an initial straight state that otherwise defines a linear axis;
bending the shaft to a first bent state in which a portion of the shaft is deflected relative to the linear axis, wherein the shaft independently maintains a shape of the first bent state;
positioning the tip at a tissue target site;
dispensing conductive fluid from the internal lumen to the tissue target site via the at least one passage; and

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applying energy to the dispensed fluid by energizing the tip;
wherein the energized conductive fluid heats tissue at the tissue target site.

40.(Original) The method of claim 39, wherein the tissue target site is within a patient's heart, the method further comprising:

accessing the tissue target site by opening a chest of a patient.

41.(Original) The method of claim 40, further comprising:

evaluating a desired lesion pattern along the tissue target site; and
determining a desired shape of the shaft based upon the evaluated lesion pattern;
wherein the step of bending the shaft results in the first bent state approximating the
determined, desired shape.

42.(Original) The method of claim 41, further comprising:

determining a second desired shape of the shaft; and
bending the shaft to a second bent state based upon the determined second shape, the
shaft independently maintaining a second shape in the second bent state.

43.(Original) The method of claim 39, wherein providing an electrosurgical instrument includes forming the shaft to include an elongated electrode body tube otherwise forming the distal section and an electrical insulator surrounding the electrode body proximal the distal section.

44.(Previously Presented) The method of claim 39, wherein the step of bending is performed by a surgeon.

45.(Previously Presented) The method of claim 39, wherein the step of bending the shaft is performed manually.

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46.(Previously Presented) The method of claim 39, wherein the step of bending the shaft is manually performed by a user holding the shaft with at least one hand and applying a bending force.

47.(Previously Presented) The method of claim 39, wherein the step of bending includes:
determining a desired bend point;
grasping the shaft within a user's hand at a location distal the desired bend point; and
applying a force to the shaft distal the desired bend point via the user's hand.

48.(Previously Presented) The method of claim 39, wherein the step of bending the shaft to the first bent state includes defining a bend angle at a first bend point, the method further comprising:

bending the shaft to a second bent state characterized by a different bend angle at the first bend point, wherein the shaft independently maintains a shape of the second bent state.

49.(Previously Presented) The electrosurgical instrument of claim 1, wherein the shaft is adapted to be manually transitioned from the straight state by a surgeon.

50.(Previously Presented) The electrosurgical instrument of claim 1, wherein the shaft is adapted to be manually transitionable from the first bent state to a second bent state and independently maintain a shape of the second bent state.

51.(Previously Presented) The method of claim 39, and further comprising:
evaluating a constraint presented at a tissue target site, wherein evaluating the constraint occurs after providing the electrosurgical instrument, but prior to bending the shaft.

52.(Previously Presented) The method of claim 51, and further comprising:

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determining an optimal shape of the elongated shaft after evaluating the constraint presented at the tissue site, but prior to bending the shaft.

53. (New) An electrosurgical instrument comprising:

an elongated shaft defining a proximal section, a distal section, and an internal lumen extending from the proximal section, wherein the distal section forms an electrically conductive rounded tip and defines at least one passage fluidly connected to the lumen for distributing fluid from the lumen outwardly from the shaft, and further wherein an entirety of the shaft is transitionable from:

a first shape,

to a second shape different from the first shape, the shaft independently maintaining the second shape; and

a non-conductive handle rigidly coupled to the proximal section of the shaft;

wherein an exterior of the shaft distal the handle and proximal the distal section is electrically non-conductive.